

**IN THE CLAIMS:**

Claim 1 and 18 are amended herein. All pending claims and their present status are produced below.

1 1. (Currently Amended) An optical communications system for communicating information  
2 comprising:

3 a receiver subsystem comprising:

4 an optical splitter for splitting a composite optical signal having at least two  
5 subbands of information and at least one tone into at least two optical  
6 signals; and

7 at least two heterodyne receivers, each heterodyne receiver coupled to receive  
8 one of the optical signals from the optical splitter for recovering  
9 information from one of the subbands contained in the optical signal,  
10 each heterodyne receiver comprising:

11 a heterodyne detector for mixing an optical local oscillator signal with  
12 the optical signal to produce an electrical signal which includes  
13 a frequency down-shifted version of the subband and the tone  
14 of the optical signal; and

15 a signal extractor coupled to the heterodyne detector for mixing the  
16 frequency down-shifted subband with the frequency down-  
17 shifted tone to produce a frequency component containing the  
18 information;

19 wherein a signal extractor of one of the at least two heterodyne receivers

20 comprises a bandpass filter, a square law device, and a low pass filter

21 and is configured to square an optical signal containing a tone and a

22 sideband, and wherein a signal extractor of another of the at least two

23 heterodyne receivers comprises two extraction paths and a combiner,

24 each extraction path configured to process a sideband within an

25 electrical signal.

26           2. (Previously Amended) The optical communications system of claim 1 wherein the  
27 optical splitter includes a separate splitter for separating each optical signal from the  
28 composite signal.

29           3. (Original) The optical communications system of claim 1 wherein the optical  
30 splitter includes an optical power splitter for splitting the composite optical signal into optical  
31 signals which are substantially the same in spectral shape.

32           4. (Original) The optical communications system of claim 1 wherein the optical  
33 splitter includes a wavelength division demultiplexer for wavelength division demultiplexing  
34 the composite optical signal into the optical signals.

35           5. (Original) The optical communications system of claim 1 wherein the optical  
36 splitter includes a wavelength-selective optical power splitter for splitting the composite  
37 optical signal into optical signals, each optical signal including a different primary subband  
38 and attenuated other subbands.

39           6. (Original) The optical communications system of claim 1 wherein:  
40 the electrical signal further comprises direct detection components; and  
41 the frequency down-shifted version of the subband does not spectrally overlap with  
42 the direct detection components.

43           7. (Original) The optical communications system of claim 1 wherein the heterodyne  
44 detector comprises:

45           an optical combiner for combining the optical local oscillator signal and the optical  
46 signal; and  
47 a square law detector disposed to receive the combined optical local oscillator signal  
48 and optical signal.

49           8. (Original) The optical communications system of claim 1 further comprising:  
50 an optical wavelength filter coupled between the optical splitter and one of the  
51 heterodyne receivers.

52           9. (Original) The optical communications system of claim 1 wherein the tone for  
53 each optical signal is located at an optical carrier frequency for the corresponding subband.

54           10. (Original) The optical communications system of claim 1 wherein the tone for  
55 each optical signal includes a pilot tone located at a frequency other than at an optical carrier  
56 frequency for the corresponding subband.

57           11. (Original) The optical communications system of claim 1 wherein at least two  
58 optical signals have tones at the same frequency.

59           12. (Original) The optical communications system of claim 1 wherein the frequency  
60 component includes a difference component.

61           13. (Original) The optical communications system of claim 1 wherein the receiver  
62 subsystem further comprises:

63               at least two FDM demultiplexers, each FDM demultiplexer coupled to receive the  
64               frequency component from one of the heterodyne receivers for FDM  
65               demultiplexing the frequency component into a plurality of electrical low-  
66               speed channels.

67           14. (Original) The optical communications system of claim 13 wherein the receiver  
68 subsystem further comprises:

69               at least two QAM demodulation stages, each QAM demodulation stage coupled to  
70               one of the FDM demultiplexers for QAM demodulating the electrical low-  
71               speed channels.

72           15. (Original) The optical communications system of claim 1 further comprising:  
73 a transmitter subsystem for generating the composite optical signal.

74           16. (Original) The optical communications system of claim 15 wherein the  
75 transmitter subsystem comprises:

76               at least two transmitters, each for generating one of the subbands, each transmitter  
77               using a different optical carrier frequency; and

78 an optical combiner coupled to the transmitters for optically combining the subbands  
79 into the composite optical signal.

80 17. (Original) The optical communications system of claim 15 wherein the  
81 transmitter subsystem comprises:

82 at least two electrical transmitters for generating electrical channels;  
83 an FDM multiplexer coupled to the electrical transmitters for FDM multiplexing the  
84 electrical channels into an electrical high-speed channel, the electrical high-  
85 speed channel further including the tones; and  
86 an E/O converter coupled to the FDM multiplexer for converting the electrical high-  
87 speed channel into the composite optical signal.

88 18. (Currently Amended) A method for recovering information from a composite  
89 optical signal containing the information, the method comprising:

90 receiving a composite optical signal having at least two subbands of information and  
91 at least one tone;

92 splitting the composite optical signal into at least two optical signals; and

93 for each optical signal:

94 receiving a signal from an optical local oscillator;

95 detecting the optical signal using heterodyne detection and the optical local  
96 oscillator to produce an electrical signal which includes a frequency  
97 down-shifted version of one of the subbands and the tone of the optical  
98 signal; and

99 mixing the frequency down-shifted subband with the frequency down-shifted  
100 tone to produce a frequency component containing the information,

101 wherein the step of mixing comprises one of: mixing by a signal  
102 extractor comprising a bandpass filter, a square law device, and a low  
103 pass filter configured to square an optical signal containing a tone and  
104 a sideband and mixing by a signal extractor comprising two extraction  
105 paths and a combiner, each extraction path configured to process a  
106 sideband within an electrical signal.

107 19. (Original) The method of claim 18 wherein the step of splitting the composite  
108 optical signal into at least two optical signals includes separating each optical signal from the  
109 composite optical signal.

110 20. (Original) The method of claim 18 wherein the step of splitting the composite  
111 optical signal into at least two optical signals includes splitting the composite optical signal  
112 into optical signals which are substantially the same in spectral shape.

113 21. (Original) The method of claim 18 wherein the step of splitting the composite  
114 optical signal into at least two optical signals includes wavelength division demultiplexing  
115 the composite optical signal into the optical signals.

116 22. (Original) The method of claim 18 wherein the step of splitting the composite  
117 optical signal into at least two optical signals includes wavelength selectively splitting the  
118 composite optical signal into optical signals, each optical signal including a different primary  
119 subband and attenuated other subbands.

120 23. (Original) The method of claim 18 wherein the step of detecting the optical signal  
121 using heterodyne detection and the optical local oscillator comprises:  
122 optically combining the optical local oscillator signal and the optical signal; and  
123 detecting the combined optical local oscillator signal and optical signal using square  
124 law detection.

125 24. (Original) The method of claim 18 wherein the tone for each optical signal is  
126 located at an optical carrier frequency for the corresponding subband.

127 25. (Original) The method of claim 18 wherein the tone for each optical signal  
128 includes a pilot tone located at a frequency other than an optical carrier frequency for the  
129 corresponding subband.

130 26. (Original) The method of claim 18 further comprising, for each optical signal:

131 FDM demultiplexing the frequency component into a plurality of electrical low-speed  
132 channels.

133 27. (Original) The method of claim 26 further comprising, for each optical signal:  
134 QAM demodulating the electrical low-speed channels.

135 28. (Original) The method of claim 18 further comprising:  
136 encoding the information in a composite optical signal; and  
137 transmitting the composite optical signal across an optical fiber.

138 29. (Original) The method of claim 28 wherein the step of encoding the information  
139 in a composite optical signal comprises:  
140 encoding the information onto subbands, each subband located at a different optical  
141 carrier frequency; and  
142 optically combining the subbands to produce the composite optical signal.

143 30. (Original) The method of claim 28 wherein the step of encoding the information  
144 in a composite optical signal comprises:  
145 generating electrical channels;  
146 FDM multiplexing the electrical channels into an electrical high-speed channel, the  
147 electrical high-speed channel further including the tones; and  
148 converting the electrical high-speed channel from electrical to optical form to produce  
149 the composite optical signal.

150 31. (Original) The method of claim 28 wherein the step of encoding the information  
151 in a composite optical signal comprises:  
152 receiving an optical carrier; and  
153 modulating the optical carrier with the information using a raised cosine modulation  
154 biased at a point substantially around a  $V_{\pi}$  point.